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на фиг. 3 - разрез Б-В на фиг. 1; на фиг. 4 и 5 - устройство в рабочем положении; на фиг. 6 - то же, после окончания работы.

Устройство (фиг. 1) состоит из составного полого перфорированного корпуса 1 с надетым на него эластичным трубчатым элементом 2. Поверх эластичного элемента 2 помещен расширяемый пластырь 3, изготовленный из антикоррозийного металла, обладающего необходимыми прочностными и упругими свойствами, например, нержавеющей стали.

Эластичный трубчатый элемент 2 крепится к корпусу 1 при помощи муфт 4. В верхней части корпуса 1 имеется резьба для подсоединения перекачивающей 5. Нижняя часть составного корпуса, имеющая радиальные отверстия  $\alpha$  и  $\beta$ , опирается на крышку 6 с калиброванными отверстиями  $\delta$ .

Узел фиксации пластыря 3 от продольного перемещения выполнен в виде штука 7 с седлом 2, выемками  $\theta$  и пружиной 8, на которой шарикоподшипники 9. В отверстиях  $\theta$  корпуса 1 расположены упоры 8, снабженные шарикоподшипниками 9. На упоры 8 опирается пластырь 3 при спуске устройства в скважину. Втулка 7 удерживается от самопронизательного перемещения срезной шпилькой 10. Ограничителем перемещения втулки 7 служит срезная элемент 11, установленный в нижней части корпуса 1.

Устройство работает следующим образом.

После спуска устройства на буровых или насосно-компрессорных трубах в скважину на необходимую глубину в трубу забрасывается шар 12, который садится в седло 2 втулки 7 и перекрывает в ней центральный канал (фиг. 4). Под действием давления закачиваемой жидкости эластичный элемент 2 расширяется и входит в контакт с пластырем 3. При достижении определенного давления во внутренней полости труб и эластичного элемента 2 пластырь 3 деформируется и прижимается к стенкам скважины, перекрывая место повреждения обсадной колонны или зону поглощения жидкости. В случае ликвидации повреждения обсадной колонны по концам оболочки 3 в расточках помещаются резиновые уплотнительные кольца, обеспечивающие герметичность пластыря.

После того, как участок пластыря 3, контактирующий с рабочей частью эластичного элемента 2, прижмется к стенке скважины, давление жидкости в трубах повышается до такой величины, при которой срезная шпилька 10 разрушается. При этом втулка 7 перемещается вниз до упора в срезной эле-

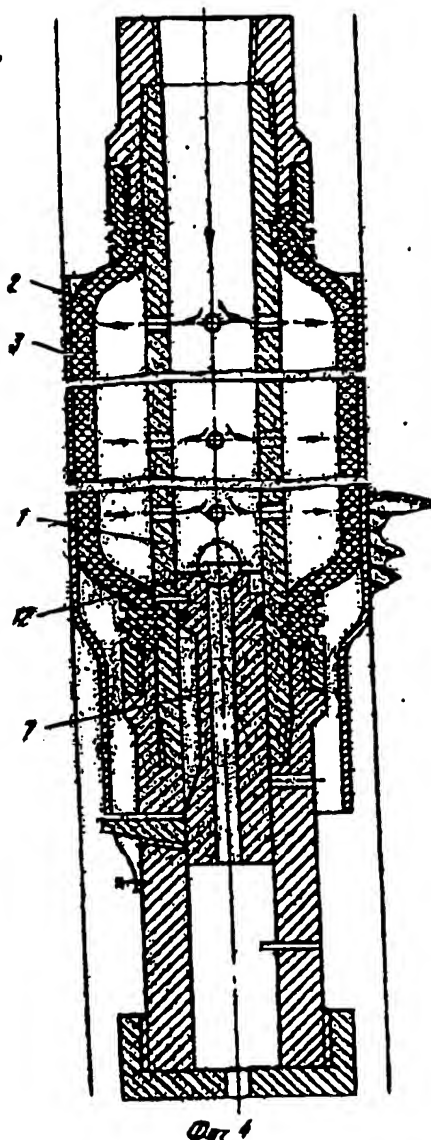
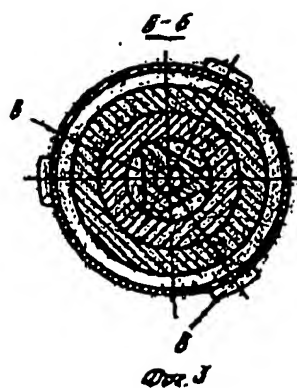
мент 11 (фиг. 5). Преждевременный срез элемента 11 при перемещении втулки 7 исключается за счет того, что дросселирование жидкости, вытекающей из корпуса 1 через штуку 7, создает гидравлический демпфер, который обеспечивает плавное без удара перемещение втулки 7. При этом положении втулки 7 (фиг. 5) выемки  $\theta$  оказываются против упоров 8. Под действием пружины 9 упоры 8 перемещаются внутрь корпуса 1 и утапливаются в выемках  $\theta$  втулки 7 (фиг. 5). Для деформации и герметичного прижатия к стенке скважины нижней части пластыря 3 давление в трубах снижают, эластичный трубчатый элемент 2 приобретает первоначальную форму, затем устройство опускают на определенную величину. Нагнетая в трубы жидкость и повышая ее давление до известного предела, производят деформацию нижней части пластыря 3. После окончания операции по установке пластыря перед подъемом инструмента на поверхность давление жидкости в трубах повышают до срезающей величины 10, при этом втулка 7 перемещается в крайнее нижнее положение (фиг. 6). При этом втулка 7 со-

сдвигается с радиальным отверстием  $\alpha$  в корпусе 1 и внутренняя полость труб сообщается с затрубным пространством, что обеспечивает опорожнение труб при подъеме инструмента. Упоры 8 остаются в таком положении, при котором может быть осуществлен беспрепятственный подъем инструмента на поверхность. Перемещая втулку 7 в крайнее верхнее положение и заменив срезные элементы 10 и 11 на новые, готовят устройство для проведения следующих операций по установке пластыря в скважинах. Для удобства сборки элемент 10 можно устанавливать в корпус 1 под втулкой 7.

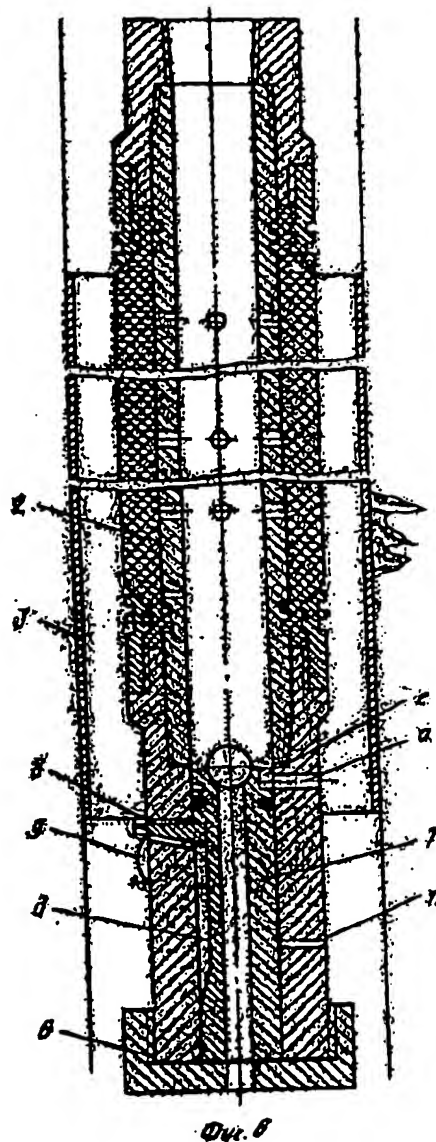
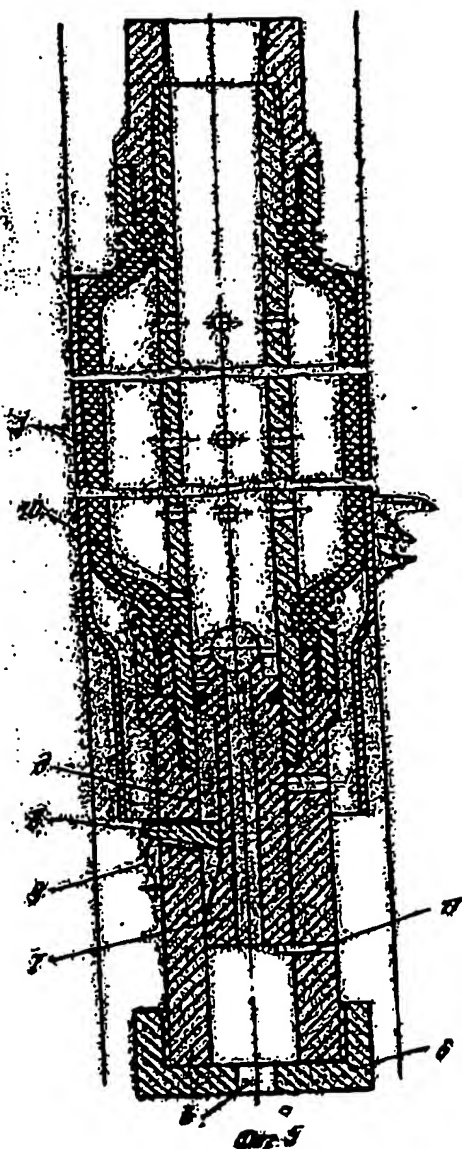
Удерживание пластыря 3 при спуске инструмента в скважину осуществляется при помощи узла (элементы 7 - 9), размещенного в нижней части корпуса 1 (фиг. 1) и являющегося оптимальным вариантом. Кроме указанного, могут быть применены два узла, отличающихся по конструктивному исполнению и размещенных в верхней и нижней части корпуса 1. Возможен и такой вариант удерживания оболочки 3, при котором используется описанный узел, размещенный в нижней части корпуса и разрушаемый штифт, фиксирующий оболочку 3 в верхней ее части. Разрушение штифта и освобождение оболочки 3 может быть осуществлено либо при деформации эластичного элемента 2, либо при перемещении втулки 7.



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[Translator's Note: Original Russian was very blurred. Guesses and other uncertainties marked by [?] when appropriate.]

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#### (54) A DEVICE FOR PLACING A PATCH IN A WELL

##### 1

The invention relates to drilling and operation of oil and gas wells, and specifically to devices that can be used for sealing locations of damage to the casing or a fluid loss zone.

A device is known for placing a patch in a casing, including a [illegible, might be corrugation or corrugated] patch and [illegible, might be "securing at the lower end"] [illegible] hydraulic coring head [illegible, might be "with guide [illegible] and conical ram"] [1].

However, the use of the aforementioned device is associated with significant difficulties in the manufacture of the corrugated pipes for the patch and placing the patches downhole. The latter is explained by the fact that if the strength of preliminary bonding of the patch to the string is insufficient, during pulling the corrugated patch [illegible] may shift and the location of the damage will remain unsealed.

The device closest to the invention is a device for placing a patch in a well that includes a hollow perforated body with an elastic tubular element secured thereon, a patch to be expanded, and a

locking assembly to keep the patch from moving longitudinally [2].

A disadvantage of that device is the poor reliability in operation, associated with problems in the design of the patch locking assembly. This may lead to incomplete pressing of the patch and jamming of the entire device in the well.

The aim of the invention is to improve the reliability of operation of the device.

The aforementioned aim is achieved by the fact that in the device for placing a patch downhole, including a hollow perforated body with an elastic tubular element secured thereon, a patch to be expanded, and a locking assembly to keep the patch from moving longitudinally, the latter is implemented as spring-controlled stops and a bushing secured within the body by shear pins, with a seat for a ball that will be dropped and recesses on the outer surface, where the body has radial through holes for disposition therein of the spring-controlled stops, mounted in the plane of the recesses in the bushing.

Fig. 1 shows a general view of the device in the run-in position; Fig. 2 shows the A—A section in Fig. 1;



Fig. 3 shows the B—B section in Fig. 1; Figs. 4 and 5 show the device in the working position; Fig. 6 shows the same, after the work is completed.

The device (Fig. 1) consists of a composite hollow perforated body 1 with an elastic tubular element 2 slipped onto it. On top of elastic element 2 is placed the patch 3 to be expanded, fabricated from corrosion-resistant metal having the required strength and elastic properties, such as stainless steel.

Elastic tubular element 2 is secured to body 1 with the help of sleeve coupling 4. In the upper portion of body 1, there is a thread for joining [illegible] 5. The lower portion of the composite body, having radial holes *a* and *b*, [two illegible words] cap 6 with calibrated orifice *c*.

The locking assembly to keep patch 3 from moving longitudinally is implemented as bushing 7 with seat *d*, recesses *e* and [illegible-2 words] *f* on the outer surface. Stops 8, provided with springs 9, are disposed in through holes *b* of body 1. Patch 3 is supported[?] on stops 8 as the device is lowered downhole. Bushing 7 is restrained from unintended movement by shear bolt 10. Shear member 11, mounted in the lower portion of body 1, serves as a limit stop to limit movement of bushing 1.

The device operates as follows.

After the device is lowered downhole on drill pipes or tubing to the required depth, ball 12 is tossed into the pipe and lands in seat *d* of bushing 7, and closes off the central channel therein (Fig. 4). Under the action of the pressure of the injected fluid, elastic element 2 expands and makes contact with patch 3. When a certain pressure is reached in the internal cavity of the pipes and elastic element 2, patch 3 is deformed and squeezed against the wall of the well, sealing off the location of damage to the casing or the fluid loss zone. In the case when damage to the casing is to be repaired, at the ends of sleeve 3, rubber packing rings are placed in the bores to ensure leaktightness of the patch.

After the section of patch 3 in contact with the working part of elastic element 2 has been squeezed against the wall of the well, the pressure of the fluid in the pipes is increased up to the value at which shear bolt 10 fails. Then bushing 7 moves downward as far as it will go toward shear

member 11 (Fig. 5). Premature shearing off of member 11 on movement of bushing 7 is prevented because throttling of the fluid displaced from body 1 by moving bushing 7 through calibrated orifice *b* in cap 6 creates a hydraulic shock absorber, which ensures smooth movement of bushing 7 without jarring. In this position of bushing 7 (Fig. 5), recesses *e* are against stops 8. Under the action of springs 9, stops 8 move inside body 1 and drop into recesses *e* of bushing 7 (Fig. 5). In order to deform and tightly squeeze the lower part of patch 3 against the wall of the well, the pressure in the pipes is released, elastic tubular element 2 takes on its original shape, then the device is lowered by a certain amount. By heating the fluid in the pipe and raising its pressure up to the known limit, the lower part of patch 3 is deformed. After the operation of placing the patch is completed and before lifting the tool to the surface, the pressure of the fluid in the pipes is raised until bolt 10 shears off, at which point bushing 7 moves to the extreme lower position (Fig. 6). Slot *f* in bushing 7 matches radial hole *a* in body 1 and the inner cavity of the pipes communicates with the casing string—borehole annular space, which ensures draining of the tubes when the tool is lifted. Stops 8 remain in a position for which the tool can be lifted unhindered to the surface. The device is prepared for carrying out the next operations of placing patches downhole by moving bushing 7 to the extreme upper position and replacing shear members 10 and 11 with new ones. For convenience of assembly, member 10 can be mounted in body 1 under bushing 7.

Patch 3 is restrained during lowering of the tool downhole with the help of the assembly (elements 7-9) disposed in the lower portion of body 1 (Fig. 1), being the optimal embodiment. In addition to the aforementioned, two assemblies may be used, identical in design and disposed in the upper and lower portion of body 1. An embodiment of the restraint of sleeve 3 is also possible for which the described assembly is used, disposed in the lower part of the body, and the breakable pin that locks sleeve 3 is disposed in its upper part. Fracture of the pin and release of sleeve 3 may be accomplished either by deformation of elastic element 2 or by moving bushing 7.

Use of the proposed device makes it possible to improve the reliability of operation for elimination of leaks in the string or a fluid loss zone by preventing poor quality bonding of the patch of the device to the walls of the well. Furthermore, it eliminates the need to fabricate expensive corrugated patches on special equipment.

Thus the technical and economic impact from using the proposed device [several illegible words], consumed in elimination of leaks in the string or a fluid loss zone [illegible].

#### Claim

A device for placing a patch in a well, including a hollow

perforated body with an elastic tubular element secured thereon, a patch to be expanded, and a locking assembly to keep the patch from moving longitudinally, *distinguished by the fact that*, with the aim of improving its reliability in operation, the locking assembly to keep the patch from moving longitudinally is implemented as spring-controlled stops and a bushing, secured within the body by shear pins, with a seat for a ball that will be dropped and recesses on the outer surface, where the body has radial through holes for disposition therein of the spring-controlled stops, mounted in the plane of the recesses in the bushing.

Information sources considered in the examination.

1. US Patent No. 3179168, cl. 166-14[?], published 1965.
2. US Patent No. 3111991, cl. 166-14[?], published 1963 (prototype).

TRANSLATOR'S NOTE:

Cyrillic letters are placed on these figures to identify certain parts, but the blurred copy made it impossible to locate most of them for translation. Here is a key for the Russian letters and their English equivalents used in the translation of the text:

<b>а</b>	<b>б</b>	<b>в</b>	<b>г</b>	<b>д</b>	<b>е</b>
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>

[figures under columns 5 and 6]

[see Russian original for figure]

[see Russian original for figure]

Fig. 1

A-A

c[?]

f[?]

Fig. 2

[see Russian original for figure]

[see Russian original for figure]

$c[?]$

$B-B$

$b[?]$

Fig. 3

Fig. 4

[see Russian original for figure]

[see Russian original for figure]

Fig. 5

Fig. 6

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*Patent 1051222 A*  
*Patent 1086118 A*  
*Patent 1749267 A1*  
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*Patent 1663179 A2*  
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*Patent 1002514*

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**AFFIDAVIT CONTINUED**

(Russian to English Patent/Abstract Translations)

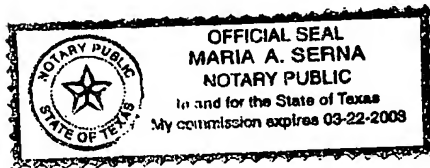
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9th day of October 2001.

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